

Lesson 3 – Planning for an Inventory

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This lesson is on planning for an inventory.

Upon completion of this lesson, you will be able to:

- Describe why planning and initial documentation is important,
- Identify the key resource issues to consider,
- Describe the main approaches to inventory development,
- Contrast the two emission estimation approaches, and
- Describe the different emission types to be inventoried.

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Importance of Planning

Careful and thorough planning of the inventory procedures will greatly facilitate the process and can prevent the need for costly revisions to the inventory during and after review. Air quality agencies compile emission inventories for a variety of purposes including: providing data required to evaluate ambient air quality, responding to legislation, or assessing the effectiveness of an air pollution policy. The anticipated purpose of the inventory will dictate the level of complexity and accuracy required, but each inventory requires extensive advanced planning.

When planning, it is important to consider all the steps in the process and resources available.

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The Inventory Preparation Plan

Before the inventory process begins, your agency should prepare an **inventory preparation plan (IPP)** to identify the required staffing levels, resource allocations, major milestones, and schedule for completion.

An IPP (sometimes referred to as an inventory work plan) is a concise, prescriptive document that states exactly how an agency intends to develop and present its inventory. The plan should include inventory objectives and general procedures, and should clearly describe how the inventory preparer will present and document the inventory for submission to EPA and/or others.

As part of the IPP process, you should consider the following:

- End uses of the data - The inventory preparer should be clear on the intended uses of the data. Examples of emission inventory uses are rulemaking, air toxics risk assessment, and regional scale air quality modeling.
- Scope of the inventory - The inventory preparer should know what the time period, geographic coverage, pollutants, and other coverages will be in the inventory.
- Availability and usefulness of existing data - The inventory preparer should learn about existing emission inventory and related data, how comprehensive and accurate the data are, and how useful the data would be in the preparation of an updated emission inventory.

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- Strategy for data collection and management - The inventory preparer should consider how data will be collected and managed during and after the emission inventory preparation process. What data system will be used? How will data be reported and distributed?
- QA/QC procedures - The inventory preparer should consider how the data will be QC'd during collection, preparation, and finalization of the inventory.

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Scope of the Inventory

When considering the scope of the inventory, keep in mind some of these questions:

- What year should the inventory cover?
- What sectors will the inventory cover, point, nonpoint, and/or mobile?
- Geographic coverage? (County, tribal area, state or region)
- Pollutant coverage? (Criteria and or HAPs. Which HAPs)
- There are many things that need to be decided in the planning phase.

Deciding on them now will save you lots of time and money later.

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Topics for the IPP

The IPP is where Quality Assurance and Quality Control and Documentation procedures need to be established. Setting documentation guidelines at the outset is a good first step in creating a credible inventory.

Other details that should be established during planning are:

- File contents: Each member of the team should be aware of what materials must be placed in the project files;
- Location of all paper and electronic records;
- Ensuring that all hard copy records, as well as electronic databases and spreadsheets, are kept up-to-date;
- Procedures for adding data or background documentation to the file, including log-in procedures;
- Data tracking: To document who entered or manipulated data;
- Access to files: Checkout policies for paper documents, computer security policies for electronic files;
- Backup and maintenance of electronic files;
- File name conventions; and
- Reporting of data – who will the final inventory be reported to and in what format?

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Resources Issues to Consider

A key component of planning, is determining what resources are available to perform the tasks needed. In general, the data quality needs of the program will dictate the level of effort required for planning, executing, and quality assuring the results.

- **Staff-** What experience level is required and who is available to perform the task? Do you have the right people? When are they available?
- **Budget-** Is there enough money? Is it coming from local or federal sources? Do you need to request funding for inventory development in the Section 105 Grant Process?
- **Time-** How much time will it take to gather the information, calculate the emissions, compile the inventory, and perform the quality assurance/quality control tasks? What will the effort cost the agency in labor hours and time?
- **Data Processing-** Do you have adequate computer hardware (including storage capacity and backup capability) and the necessary software capable of processing and exchanging data with other organizations?
- **Communication-** What will be the coordination of effort within the agency? How will we work with people outside the agency?

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Please answer the following review question.

Match the resource consideration, with the question that best pertains to it.

Time	Does the Section 105 Grant negotiations address inventory development?
Funding	What will the effort cost the agency in labor hours and time?
Proper Staffing	Who needs to give us approval to work with their people?
Intra- agency cooperation	Do we have the right skill sets on the team?

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Approaches to Inventory Development

When planning the inventory, consider which approach will be used for estimating emissions. There are two main techniques to consider: top-down and bottom up.

A **top-down approach** means that your agency develops emission estimates based on national, regional or state data. You scale the national or regional estimates to your inventory area using some measure of activity data thought to be directly or indirectly related to the emissions in your area of study. Typically, sales data, or per employee, or per capita emission factors are used.

A **bottom-up approach** means you estimate emissions for individual sources and sum all sources to obtain state- or national-level estimates.

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Summary of Approaches

Both approaches have their advantages and disadvantages. The top-down approach is usually used when local data are not available, the cost to gather local information is prohibitive, or the end use of the data does not justify the cost of collecting detailed site-specific data.

The chart on the screen summarizes some of the key characteristics of each approach.

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Emissions to be Inventoried

Irrespective of whether a top-down or a bottom-up approach is used, inventories can be compiled using actual emissions, allowable emissions, or emissions based on a facility's potential to emit depending on the purpose of the inventory. The type of emissions should conform to the end use of the inventory and the availability of data.

Actual emissions are defined as the actual rate of emissions of a pollutant from a source (or emission unit within a source) calculated using actual operating hours, production rate, and where applicable, fuel combusted during the period of interest. For example, base year inventories developed in support of a SIP are compiled using actual emissions.

Allowable emissions are the product of an enforceable emissions rate (e.g., permitted pounds of VOC per gallon of solids applied), the anticipated operating rate or activity level (e.g., gallons of solids applied per hour), and the anticipated operating schedule (hours per day). In general, allowable emissions may be required when emission projections are being developed for use in SIP modeling.

Potential to emit (i.e., potential emissions) is the capability of a source, at maximum design capacity, to emit a pollutant after the application of air pollution control equipment. Potential to emit estimates are based on the maximum capacity of a source after taking into consideration enforceable permit conditions such as the type of materials combusted, the type of material processed, and the annual hours of operation. In general, potential emissions are estimated and reported in inventories in support of permitting activities under Title V of the Clean Air Act and may also be used in risk assessment analyses.

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Review Question

True or false:

The top-down approach is the preferred method for developing an emissions inventory because it requires less manpower to conduct the inventory and is just as accurate as other approaches.

- a. True
- b. False

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Types of Sources to be Inventoried

After you identify the pollutants to be inventoried, you will need to identify the source categories to be included in the emissions inventory. The number and types of the sources to be included is generally determined by the regulations driving the need for the inventory. It is important that the inventory planners specify which sources are to be included.

The approaches and sources of information for identifying which sources to include in your inventory vary according to the type of source that is being inventoried. As such, the approaches and sources of information for point sources and Nonpoint sources are discussed separately.

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Types of Point Sources to be Inventoried

EPA has published several documents containing general guidance for compiling emission inventories. These EPA documents identify numerous source categories for point sources and these are good starting points for developing a list of point source categories in the inventory area. However, not all the sources listed in these documents may be operating in your inventory area. Since the source category coverage is driven by the pollutants of interest, you should research possible sources for the particular pollutants and determine if any are operating in the inventory area.

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Approaches to Identifying Point Sources

There are many techniques for identifying point sources for the inventory. Some are:

- Research all of the documents and tools made available by EPA, the historical and current knowledge of your inventory area, and current research publications. All possible source categories for the given pollutant and inventory type should be investigated;
- Eliminate any sources that are not found within the inventory area.
- Prioritize the list of remaining categories based on the expected magnitude of emissions or some other measure of importance, such as the purpose of the inventory, regulated sources, sources under study for future regulations, or sources of specifically targeted pollutants;
- Consider the time and budget constraints under which you are operating; such constraints may require that the list of remaining source categories be reduced further. Resources should be allocated preferentially to the sources that are most important for meeting the inventory objectives;
- Eliminate from your source category list any categories for which no emission factors or acceptable methods have been developed.
- Document your decisions for the benefit of future preparers who may be able to expand the inventory's coverage or scope.

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Sources of Information for Identifying Point Sources to be Inventoried

Sources of information that are useful for identifying which point sources to inventory are as follows:

- The National Emissions Inventory, NEI database
- State and local commerce directories
- Existing state inventories of criteria pollutants and HAPs. An existing point source inventory is the best source of information, particularly if it has been frequently updated and well documented. A list prepared from the existing inventory will require updating by deleting any point source that has discontinued operation, making appropriate changes for any source that has changed status, and adding new point sources.
- Other agency files: Existing registration program of point sources (through annual inventory submittal programs, permit renewal programs, Risk Management Plan submittals, and/or upset and malfunction reports) though such programs usually do not include smaller significant point sources or fugitive emissions. Also, compliance, enforcement, and permit files are a useful source of information.

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Sources of Information for Identifying Point Sources to be Inventoried (Cont.)

- Toxic Release Inventory (TRI) data for your state
- Files of other government agencies such as labor, tax, commerce and trade agencies. State and local industrial directories typically contain companies listed alphabetically by SIC code and county;
- Standard and Poors, Registration of Corporations;
- Thomas Register;
- Trade and professional societies;
- The Dun and Bradstreet Million Dollar Directory listing companies with sales over \$1,000,000 per year by SIC code and county that can be located at www.dnb.com; and
- Information regarding industries that are prevalent in the state. Finally, it should be noted that your agency may establish emission cutoff levels to exclude smaller sources from the inventory.

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Types of Nonpoint Sources to be Inventoried

A Nonpoint source inventory enables the agency to estimate emissions collectively for those sources that release small amounts of a given pollutant and/or are too numerous to be inventoried individually as part of the point source inventory.

To compile a Nonpoint source inventory, you will need to identify two different types of sources:

- Facilities, or activities within facilities, that emit levels of pollutants below the threshold level for point sources: Such facilities include dry cleaners and segments of the graphics arts industry, and

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- Activities that result in emissions of pollutants below the threshold level for point sources: You will need to consider a diverse group of activities including surface coating, pesticide application, solvent use, asphalt use, agricultural burning, construction, residential wood combustion, and livestock production.

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Approaches to Identifying Nonpoint Sources

Because the source categories included in the inventory are driven by the pollutants of interest, you should research possible sources of pollutants and determine if any are operating in your inventory area. Specifically, you should:

- First review existing inventories for your area;
- Research all of the documents and tools made available by EPA, the historical and current knowledge of your inventory area, and current research publications. All possible source categories for the given pollutant and inventory type should be investigated;
- Eliminate any sources that are not found within the inventory area. For example, aviation gasoline distribution and open burning of scrap tires may not occur in the inventory area;
- Prioritize the list of remaining categories based on the expected magnitude of emissions or some other measure of importance, such as the purpose of the inventory, regulated sources, sources under study for future regulations, or sources of specifically-targeted pollutants;
- Consider the time and budget constraints under which you are operating; such constraints may require that the list of remaining source categories be reduced further. Resources should be allocated preferentially to the sources that are most important for meeting the inventory objectives;
- Eliminate from your source category list any categories for which no emission factors or acceptable methods have been developed.
- Document your decisions for the benefit of future preparers who may be able to expand the inventory's coverage or scope.

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Sources of Information for Identifying Nonpoint Sources to be Inventoried

Sources of information that are useful for identifying which Nonpoint source categories to inventory are existing state/local inventories of criteria pollutants and HAPs. An existing Nonpoint source inventory is the best source of information, particularly if it has been frequently updated and well documented. A list prepared from the existing inventory will require updating by:

- Deleting any Nonpoint source that has discontinued operation;
- Making appropriate changes for any source that has changed status; and
- Adding new Nonpoint sources.

Another source of information that is useful for identifying which Nonpoint source categories to inventory is the Toxic Release Inventory or TRI data for your state.

Page 20 Cautions

You should also be aware that some source categories such as electric utilities are usually treated as point sources and some source categories such as woodstove and fireplace use, are almost always treated as Nonpoint sources. However, others, such as dry cleaners and service stations, can be either point or Nonpoint sources depending on the size of the operation and the corresponding emission levels. Even within a point source facility, some activities occur that are more easily treated as Nonpoint source emissions. Some emissions associated with surface coating operations such as equipment cleaning, for example, can be more practically estimated using Nonpoint source methods. When a point source inventory and a Nonpoint source inventory estimate emissions from the same process, there is the possibility that emissions could be double counted. You may need to adjust the Nonpoint source inventory to avoid double counting.

You should also be cautious when using existing inventories or existing registration programs as sources of information on facilities. In general, you will be dealing with the same type of sources in both criteria and HAP inventories because most HAPs are a subset of either PM or VOC. However, not every source of criteria pollutant emissions will be included in the HAPs inventory. In addition, some pollutants may be considered as HAPs, but not a criteria pollutant. Moreover, you must not rely solely on an existing inventory for a complete list of sources to be covered in your criteria pollutant or HAP inventory.

Page 21 Review Question

Which of the following types of source categories can be classified as either a point source or a nonpoint source depending on the size of the operation and the corresponding emission levels?

- a. Forest wildfires
- b. Petroleum refineries
- c. Degreasing operations
- d. Solvent use

Page 22 Data Resources

The types of data needed to compile an emissions inventory include:

- **Inventory guidance** – The primary guidance on emission inventory development is summarized in the Emission Inventory Improvement Program volumes. These volumes present EPA's recognized standard for the development of reliable, quality-rated inventories.
- **Source characterization documents** – Source characterization information is needed to identify the sources that must be included in the inventory.
- **Emission factor resources** – Some of the most commonly used emission factor resources include AP-42, and emission factor databases such as the Factor Information Retrieval (FIRE) Data System and the Air Clearinghouse for Inventories and Emission Factors (Air CHIEF)

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- **Existing inventories** – A well-documented, existing air emissions inventory is a good source of emissions data. Information contained in these inventories can at least serve as a starting point for developing extensive data and support information.
- **Activity data reference** – Activity data may be used to estimate emissions from Nonpoint and point sources. For point sources, this information can be obtained from contacts with individual facilities or other traditional sources of activity data. Nonpoint source emission estimates are generally based on surrogate activity data and an emission factor specifically for that activity. Activity data include population, employment, fuel or product usage, product sales, and type of land use correlated with air emissions.
- **Model resources** – Several emission estimation models are available for download free-of-charge. Some of these models include: TANKS, WATER and PM Calc.

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Preliminary Screening Studies

It may prove helpful during the planning process to conduct a screening study before commencing with a detailed air emissions inventory. The general idea behind a screening study is to develop preliminary estimates of emissions in order for the agency to focus its program and resources on the most important sources and pollutants. Ideally, a screening study should be performed quickly and inexpensively and yet yield results that allow the agency to make confident decisions concerning program directions. A screening study should provide the agency with enough information to determine the following:

- What pollutants should be addressed in more detail?
- What source categories should be emphasized?
- What geographic areas should be included?
- What is the relative importance of major sources and Nonpoint sources?
- To what extent can the existing inventories and permit files be used as a foundation for the inventory? and
- Can upset or equipment malfunction reports provide useful emissions data?

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Summary

Now that you have completed this lesson, you should be able to:

- Describe why planning and initial documentation is important.
- Identify the key resources issues to consider.
- Describe the main approaches to inventory development.
- Contrast the two emission estimation approaches.
- Describe the different emission types to be inventoried.

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